Commercial fishery management was enacted primarily through statues adopted by the state Legislature, until the passage of the MLMA in 1998. The MLMA transferred authority to the FGC to regulate the nearshore finfish fishery, including gopher rockfish (CDFG 2001). State commercial regulations include: license and permit regulations, finfish trap permits, a nearshore fishery permit moratorium (2001), the implementation of a nearshore fishery permit restricted access program (2003), gear restrictions, area and season and time closures, regulations pertaining to Marine Protected Areas and Commercial Management areas, depth restrictions, and a minimum total length size limit of 10 inches (254 mm) in 1999.

BIOLOGICAL PARAMETERS

The largest individual observed was 34.8 cm total length (TL) (Lea et al. 1999). Lea et al. (1999) found the relationship (R^2=0.99, n=537) between TL (mm) and weight (W in grams), sexes combined, to be

$$W = 0.00001299 * TL^{3.077} \quad (1)$$

In this assessment, data were provided in fork length. Using the total length to fork length conversion equation (mm) provided by Echeverria and Lenarz (1984)

$$FL = 0.995TL + 0.768 \quad (2)$$

we used the following length to weight equation

$$W = 0.00001299 * (FL - 0.768/0.995)^{3.077} \quad (3)$$

in this assessment. This relationship can be seen in Figure 3.

Age and growth:

Maximum age estimates of gopher rockfish in northern California range from 24 to 30 years (Bloeser 1999; Lea et al. 1999). Based on a calculated age-length relationship using whole otoliths for aging, a 20 cm (8 in) TL gopher rockfish is approximately 3-4 years, and a 25 cm (10 in) TL fish is approximately 9-10 years (Lea et al. 1999). Even though linear regression tests suggest a significant difference in growth between the sexes, calculated length-at-age by sex suggests this difference to be very small (Lea et al. 1999). We used one growth curve for both sexes in this assessment.

The precise length compositions of gopher rockfish in the wild appear to vary among locations. On a large scale, differences can be seen between northern and southern California (Figure 4). For this reason, we only used northern California for this length-based assessment, due to the lack of information on growth for species in southern California. It can also be seen

that differences appear in more localized areas. The Southwest Fisheries Science Center (SWFSC), Santa Cruz Laboratory's Groundfish Ecology Cruise Program collected specimens in Davenport and Natural Bridges near Santa Cruz (D. Pearson, NMFS, pers. comm.) and these differences can be seen in Figure 5. Fishermen have also confirmed this. There are limited data on such localized area differences, so without the previous example, this would be difficult to detect.

Parturition, Fecundity and Recruitment:

Spawning for gopher rockfish takes place between January and July, peaking in February, March, and May (Lea et al. 1999). Females ranging between 176 and 307 grams carry approximately 249 eggs per gram of body weight and will spawn hatched larvae once a year (MacGregor 1970). The larval stage lasts one to two months (Moser 1996) and it may take up to 90 days before the larvae settle out of the plankton at 20 - 40 mm (0.8 – 1.6 in) TL (Lea et al. 1999). While young juveniles are pelagic, more mature juveniles settle on rocky reefs or in the kelp canopy (Tenera 2000). While there are no estimates of annual recruitment, it is believed to be highly variable, with El Niño events providing favorable conditions for recruitment (D. VenTresca, CDFG, pers. comm.).

Maturity:

In northern California, half of the population of males and females reach maturity at 4 years (17 cm, TL) (Wyllie Escheverria 1987). By 10 years of age (23.7 cm, TL), the entire population of males will have reached reproductive maturity (Tenera 2000). In southern California waters, both males and females reach first maturity at 3 years (13 cm, TL) (Larson 1980). The approximate spawning ogive used in this assessment was

$$\text{Fraction Mature} = \exp(4.3*(L-17.7))/(1+\exp(4.3*(L-17.7))) \qquad (4)$$

where L is FL in cm, and was obtained by fitting the following values given by Wyllie Echeverria (1987): $L_{\text{first maturity}} = 17.7$cm, $L_{50\% \text{ maturity}} = 17.7$cm, and $L_{100\% \text{ maturity}} = 21$cm. The lengths were converted to fork lengths (Equation 2), and for purposes of estimation, the value of $L_{\text{first maturity}}$ was reduced to 17cm. The fit to this curve can be seen in Figure 6.